VISUAL FIELDS

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To establish the outer limits of the visual field does not constitute a complete investigation of peripheral portions of the retina and interpretation portions of investigation of peripheral portions of the retina and interpretation therefrom. There are may be areas blind to visual stimuli but surrounded by useful areas. These insular like spaces of defective vision, lying within the field, and surrounded by more or less normal field, are called scotoma.

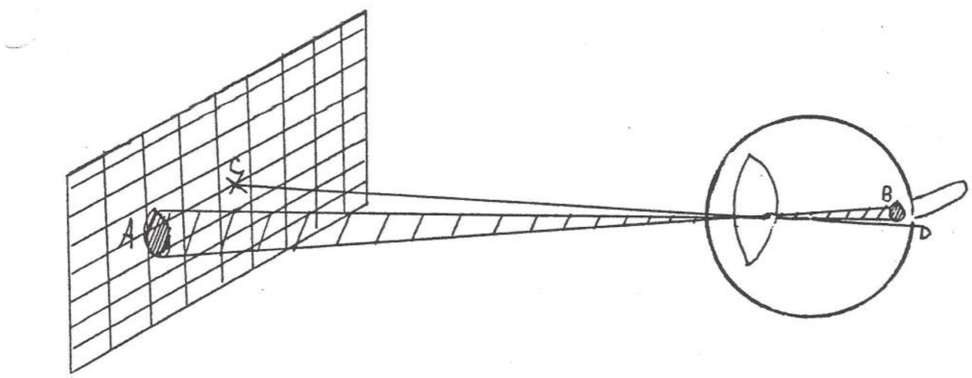
Charting scotomatas is done on the same general principle as outlining peripheral limits. A flat surface is best for this purpose, either a campimeter or a large tangent screen. On eye is occluded while the other eye is being tested. The eye under investigation is to be fixed on the central fixation point in the field. While thus fixed the test object is placed within the blind area and moved toward seeing area. When the patient can see the object the place is recorded, and once again it is moved from non-seeing area to seeing area. The test object should approach the seeing area as near perpendicular to it as possible. Tests should be taken in at least the eight principle meridians, and if any deviation from normal is indicated, sixteen meridians should be recorded.

Blind spot work should be done with a target that subtends a one-fifth degree angle. If the test is taken on the campimeter attachment to the perimeter, use the one millimeter target. Special equipment has its own targets of the proper size.

Blind spots may occur in the field other than at the normal blind spot of Marriotte. If they do they should be charted for colors as well as white. Motion should also be tested as there may be areas blind to one stimulus but not to another. Both the one millimeter target (about.17 degree) and three millimeter targets (about .5 degree) could be used for comparison.

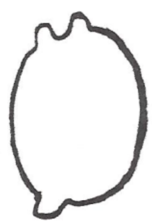
When a blind sport includes the macular area a problem is presented in getting the patient to hold fixation while the eye is being charted. A cross, or an "X" marked with white pencil or chalk may be sufficient to maintain fixation if the blind spot is only relative to some colors, or small. Encircling the fixation spot and asking the patient to stare at the center of the circle may help. Placing four of the "X's" each 3 degrees, 5 degrees or 10 degrees from the center in four principle meridians, and asking the patient to hold his eye where he can see all four crosses at once will hold the eye fairly steady despite loss of central vision. Stereoscopic campimetry sometimes holds an eye steady in the field for measuring central blind spots.

The normal physiologic blind spot is a projection into the field of the area where the retinal fibres gather into a common bundle and exit from the eye. It is located on the nasal side of each eye and is projected into each temporal field. In the diagram "A" is the projected blind spot of the nerve head "B". "C" is the projected central fixation point of the macula "D".



H. S. Gradle proclaims the center of the blind spot to be 16 ½ degrees from the fixation point and slightly below the horizontal meridian. The horizontal diameter is about 5 degrees and the vertical diameter is about 7 ½ degrees. To locate this in the eyeball we can place its center at about 2 ½ millimeters to the nasal side of the posterior pole and ½ millimeter below the horizontal line. It is approximately 1 ½ millimeters in diameter.

As the nerve fibers leave the eye they gain whitish sheathes, or coverings, called myelin, as an insulation and protection. Occasionally we find eyes where this opaque sheath extends into the eyeball, covering the fibers for several millimeters beyond the nerve head. If they do this it increases the blind area, as the opacity shuts off the light from reaching the deeper rod and cone cells. Helmholtz declared this so common that three finger-like projections for very short distances were to be considered part of the normal physiologic blind area. Exaggerated cases of opaque nerve fibers can be seen with the ophthalmoscope.



Helmholtz Blindspot

Generally accepted as normal blindspot

CLASSIFICATION OF SCOTOMA

For clinical purposes we can classify scotoma into the following categories:

POSITIVE SCOTOMA. The patient is conscious of a blind area in his field and actually saeees a dark or clouded spot projected into the field.

Cause: Peripheral lesions, as a choroidal or chorio-retinal area of pathology, or congenital defects.

NEGATIVE SCOTOMA. The patient is not conscious of a blind area. In this case the field is not discovered until the measurements are taken.

Cause: Symptomatic areas are usually due to lesions posterior to eyeball.

ABSOLUTE SCOTOMA. All perception of light is wanting including moving objects.

RELATIVE SCOTOMA. The light sense is subnormal and the perception of color is defective, usually for red or green. Sometimes known as color scotoma.

CENTRAL SCOTOMA. Location within the central zone and includes the fixation point.

PERIPHERAL SCOTOMA. The fixation point being at, or near, the edge of the defect.

PERICENTRAL SCOTOMA. The fixation point being at, or near, the center of the defect.

RING SCOTOMA. The defect surrounding, but not including the fixation point.

UNILATERAL SCOTOMA. Affecting both eyes.

BILATERAL SCOTOMA. Affecting both eyes.

SYMETRICAL SCOTOMA. Corresponding areas in both eyes involved.

It is readily seen that the same scotoma can be called by different names, but each name is specific in its meaning. For instance in a toxic amblyopia we may have a scotoma that is central, relative and negative. An absolute scotoma may be positive or negative, depending on whether the patient is aware of it. Its location would probably be a determining factor. In relative scotoma no defect is noticed for white and is not found unless colored targets are used.

Congenital color blindness for all or some of the colors may be present. Care must be used not to confuse this with color scotoma,

Achromatopsia is true and complete color blindness. With this condition colors may be seen as varying degrees of intensity.

Hemiachromatopsia is the inability to recognize colors in one half of the field.

Central achromatopsia is the inability to recognize colors in the center of the field.

By Dyschromatopsia we mean difficulty in recognizing colors, but not the complete loss.

All of the foregoing conditions must be distinguished from color amnesia (loss of color memory) and color aphasia (recognizing true color but unable to name it).

In some circumstances the field of form recognition may be collapsed to inside the normal blind spot area. If it is, of course, blind spot charting is useless. To find an enlarged blindspot means nothing unless it is established that the form field, or white field, is large enough to surround the blind spot.

Control tests in the San Francisco Poly Clinic have shown this to be true with glaucoma. In spite of the classical blind spot projection in glaucoma they cannot be measured if the whole field for white is restricted to within fifteen degrees. A blind spot, to be labeled such, must be completely surrounded with useful areas of vision.